

C L A I M S

1. A communication circuit comprising:
communications circuitry having an input and an output; and
a noise suppressor comprising:
an amorphous magnetic core and
a bifilar winding around said amorphous magnetic core.
2. A noise suppressor assembly comprising:
a multiplicity of noise suppressors, at least one of said multiplicity of noise suppressors including:
an amorphous magnetic core; and
a bifilar winding wound around said amorphous magnetic core.
3. A noise suppressor assembly according to claim 2 and wherein said multiplicity of noise suppressors includes at least first and second noise suppressors having cores containing different amorphous magnetic materials.
4. A noise suppressor assembly comprising at least one noise suppressor including:
a core including ferrite and an amorphous magnetic material; and
a bifilar winding wound around said core.
5. A noise suppressor assembly according to claim 4 and wherein said at least one noise suppressor comprises a multiplicity of noise suppressors including at least first and second noise suppressors having cores containing different amorphous magnetic materials.
6. A wide band noise suppressor comprising
a core assembly comprising a multiplicity of amorphous magnetic cores;
and
a bifilar winding wound around said core assembly.

7. A wide band noise suppressor comprising
a core comprising a mixture of a plurality of different amorphous magnetic materials; and
a bifilar winding wound around said core.

8. A signal to interference enhancer comprising:
at least one passive analog circuit operative to decrease radio frequency interference in a received signal; and
at least one active analog circuit operative to decrease radio frequency interference in said received signal,
said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal.

9. A signal to interference enhancer according to claim 8 and wherein said at least one active analog circuit comprises a subtraction circuit which cancels common mode interference.

10. A signal to interference enhancer according to claim 8 and wherein said at least one passive analog circuit comprises a passive filter which reduces the amplitude of common mode interference.

11. A signal to interference enhancer according to claim 9 and wherein said at least one passive analog circuit operates in a frequency range which is at least partially non-overlapping with a frequency range of operation of said at least one active analog circuit.

12. A signal to interference enhancer according to claim 10 and wherein said at least one passive analog circuit operates in a frequency range which is at least partially non-overlapping with a frequency range of operation of said at least one active analog circuit.

13. A signal to interference enhancer according to claim 8 and wherein said at least one passive analog circuit is operative to reduce non-common mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

14. A signal to interference enhancer according to claim 9 and wherein said at least one passive analog circuit is operative to reduce non-common mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

15. A signal to interference enhancer according to claim 10 and wherein said at least one passive analog circuit is operative to reduce non-common mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

16. A signal to interference enhancer according to claim 11 and wherein said at least one passive analog circuit is operative to reduce non-common mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

17. A signal to interference enhancer according to claim 8 and wherein said at least one passive analog circuit comprises:

a low-pass EMI filter operative to attenuate interference at frequencies above a desired frequency pass band; and

a plurality of cascaded common mode chokes connected in series with said EMI filter, said common mode chokes being operative to attenuate interference at frequencies within said desired frequency pass band.

18. A signal to interference enhancer according to claim 17 and also comprising metallic barriers located at said filter and at said cascaded common mode chokes in order to reduce parasitic input to output interference coupling.

19. A signal to interference enhancer according to claim 17 and wherein said plurality of cascaded common mode chokes include at least one choke comprising:

at least one core comprising a metal-based amorphous material and a ferrite material; and

at least one coil wound about said at least one core.

20. A signal to interference enhancer according to claim 19 and wherein said ferrite material comprises silicon steel permalloy.

21. A signal to interference enhancer according to claim 19 and wherein said amorphous material has magnetic permeability between 20,000 - 100,000.

22. A signal to interference enhancer according to claim 21 and wherein said magnetic permeability varies with changes in temperature between -30°C and 85°C by less than 5%.

23. A signal to interference enhancer according to claim 19 and wherein said amorphous material has a saturation current of at least 5 Amperes.

24. A signal to interference enhancer according to claim 19 and wherein said at least one core comprises separate core elements made of said metal-based amorphous material and of said ferrite material.

25. A signal to interference enhancer comprising:

a low-pass EMI filter operative to attenuate interference at frequencies above a desired frequency pass band; and

a plurality of cascaded common mode chokes connected in series with said EMI filter, said common mode chokes being operative to attenuate interference at frequencies within said desired frequency pass band.

26. A signal to interference enhancer according to claim 25 and wherein said plurality of cascaded common mode chokes include

at least one choke comprising at least one core comprising a metal-based amorphous material and a ferrite material; and

at least one coil wound about said at least one core.

27. A signal to interference enhancer according to claim 26 and wherein said ferrite material comprises silicon steel permalloy.

28. A signal to interference enhancer according to claim 26 and wherein said amorphous material has magnetic permeability between 20,000 - 100,000.

29. A signal to interference enhancer according to claim 27 and wherein said magnetic permeability varies with changes in temperature between -30°C and 85°C by less than 5%.

30. A signal to interference enhancer according to claim 26 and wherein said amorphous material has a saturation current of at least 5 Amperes.

31. A signal to interference enhancer according to claim 26 and wherein said at least one core comprises separate core elements made of said metal-based amorphous material and of said ferrite material.

32. A signal to interference enhancer according to claim 25 and also comprising metallic barriers located at said filter and at said cascaded common mode chokes in order to reduce parasitic input to output interference coupling.

33. A signal to interference enhancer embodied in a circuit package and comprising:

a low-pass EMI filter operative to attenuate interference at frequencies above a desired frequency pass band;

a plurality of cascaded common mode chokes connected in series with said EMI filter, said common mode chokes being operative to attenuate interference at frequencies within said desired frequency pass band; and

metallic barriers located at said filter and at said cascaded common mode chokes in order to reduce parasitic input to output interference coupling.

34. A communication noise suppressing method comprising:
- providing a communications circuitry having an input and an output;
 - providing an amorphous magnetic core;
 - winding a bifilar winding around said amorphous magnetic core and in series with at least one of said communications circuitry input and communications circuitry output; and
 - passing a communication signal from said input, through said bifilar winding and to said output for suppressing noise in said communication signal.

35. A noise suppressing method comprising:
- providing a multiplicity of magnetic cores, at least one of said multiplicity of magnetic cores comprising an amorphous magnetic core;
 - winding a bifilar winding around each of said plurality of magnetic cores;
 - connecting said bifilar windings in series; and
 - passing a signal through said bifilar windings for suppressing noise in said signal.

36. A noise suppressing method comprising:
- providing at least one core including ferrite and an amorphous magnetic material;
 - winding a bifilar winding around said at least one core; and
 - passing a signal through said bifilar winding for suppressing noise in said signal.

37. A noise suppressing method according to claim 35 and wherein said at least one core comprises a multiplicity of cores including at least first and second cores containing different amorphous magnetic materials.

38. A wide band noise suppressing method comprising:
providing a core assembly comprising a multiplicity of amorphous magnetic cores;
winding a bifilar winding wound around said core assembly; and
passing a signal through said bifilar winding for suppressing noise in said signal.

39. A wide band noise suppressing method comprising:
providing a core comprising a mixture of a plurality of different amorphous magnetic materials;
winding a bifilar winding wound around said core; and
passing a signal through said bifilar winding for suppressing noise in said signal.

40. A signal to interference enhancing method comprising:
providing at least one passive analog circuit operative to decrease radio frequency interference in a received signal;
providing at least one active analog circuit operative to decrease radio frequency interference in said received signal;
arranging said at least one passive analog circuit and said at least one active analog circuit in series; and
passing a radio frequency signal through said passive analog circuit and said active analog circuit for enhancing said signal to interference therein.

41. A signal to interference enhancing method according to claim 40 and wherein said at least one active analog circuit cancels common mode interference.

42. A signal to interference enhancing method according to claim 40 and wherein said at least one passive analog circuit reduces the amplitude of common mode interference.

43. A signal to interference enhancing method according to claim 40 and wherein said at least one passive analog circuit operates in a frequency range which is at least partially non-overlapping with a frequency range of operation of said at least one active analog circuit.

44. A signal to interference enhancing method according to claim 42 and wherein said at least one passive analog circuit operates in a frequency range which is at least partially non-overlapping with a frequency range of operation of said at least one active analog circuit.

45. A signal to interference enhancing method according to claim 40 and wherein said at least one passive analog circuit is operative to reduce non-common mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

46. A signal to interference enhancing method according to claim 41 and wherein said at least one passive analog circuit is operative to reduce non-common mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

47. A signal to interference enhancing method according to claim 42 and wherein said at least one passive analog circuit is operative to reduce non-common mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

48. A signal to interference enhancing method according to claim 43 and wherein said at least one passive analog circuit is operative to reduce non-common

mode interference due to imperfect balancing of first and second transmission lines by filtering the common mode interference.

49. A signal to interference enhancing method according to claim 40 and wherein:

said at least one passive analog circuit employs an EMI filter to attenuate interference at frequencies above a desired frequency pass band and employs a plurality of cascaded common mode chokes connected in series with said EMI filter to attenuate interference at frequencies within said desired frequency pass band.

50. A signal to interference enhancing method according to claim 49 and also comprising employing metallic barriers located at said filter and at said cascaded common mode chokes to reduce parasitic input to output interference coupling.

51. A signal to interference enhancing method according to claim 50 and wherein said at least one core comprises separate core elements made of said metal-based amorphous material and of said ferrite material.

52. A signal to interference enhancing method comprising:
employing a low-pass EMI filter to attenuate interference above a desired frequency pass band;
employing a plurality of cascaded common mode chokes connected in series with said EMI filter to attenuate interference at frequencies within said desired frequency pass band; and
passing a signal through said low-pass EMI filter and said plurality of cascaded common mode chokes for suppressing noise in said signal.

53. A signal to interference enhancing method according to claim 52 and also comprising metallic barriers located at said filter and at said cascaded common mode chokes in order to reduce parasitic input to output interference coupling.

56. A signal to interference enhancing method comprising:

employing a low-pass EMI filter to attenuate interference at frequencies above a desired frequency pass band;

employing a plurality of cascaded common mode chokes connected in series with said EMI filter to attenuate interference at frequencies within said desired frequency pass band; and

employing a metallic barriers located at said filter and at said cascaded common mode chokes to reduce parasitic input to output interference coupling.

57. ⁵⁶ A signal to interference enhancer according to claim 56 and wherein said amorphous material comprises at least one of cobalt and nickel.

58. ⁵⁶ A signal to interference enhancer according to claim 26 and wherein said amorphous material comprises at least one of cobalt and nickel.

59. ⁵⁷ A noise suppressor comprising:
an amorphous magnetic core; and
a bifilar winding wound around said amorphous magnetic core, and
wherein said amorphous magnetic core has a closed E shape.

60. ⁵⁶ A noise suppressor according to claim 1 and wherein said amorphous magnetic core has a toroidal shape.

61. ⁵⁹ A noise suppressor according to claim 1 and wherein said amorphous magnetic core has a closed E shape.

62. ⁶⁰ A noise suppressor according to claim 6 and wherein said amorphous magnetic core has a toroidal shape.

63. ⁶¹ A noise suppressor according to claim 6 and wherein said amorphous magnetic core has a closed E shape.

64. A noise suppressor according to claim 7 and wherein said amorphous magnetic core has a toroidal shape.

65. A noise suppressor according to claim 7 and wherein said amorphous magnetic core has a closed E shape.

66. A signal to interference enhancer comprising:
at least one passive analog circuit operative to decrease radio frequency interference in a received signal; and
at least one active analog circuit operative to decrease radio frequency interference in said received signal,
said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and
said at least one active analog circuit operative to interface with a modem.

67. A signal to interference enhancer comprising:
at least one passive analog circuit operative to decrease radio frequency interference in a received signal; and
at least one active analog circuit operative to decrease radio frequency interference in said received signal,
said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and
said at least one active analog circuit operative to interface with an A/D converter.

68. A signal to interference enhancing repeater comprising:
a first passive analog circuit operative to decrease radio frequency interference in a received signal;
at least one active analog circuit operative to decrease radio frequency interference in said received signal; and

a second passive analog circuit operative to decrease radio frequency interference in a received signal,

said first passive analog circuit and said active analog circuit and said second passive analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and

said at least one active analog circuit operative as an analog repeater

69. A signal to interference enhancer comprising:

at least one passive analog circuit comprising a differential input and operative to decrease radio frequency interference in a received signal; and

at least one active analog circuit comprising a single-ended output and operative to decrease radio frequency interference in said received signal,

said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and wherein said differential input serves as the input of the cascaded circuit and said single-ended output serves as the output of the cascaded circuits.

70. A signal to interference enhancer comprising:

at least one passive analog circuit operative to decrease radio frequency interference in a received signal; and

at least one active analog circuit operative to decrease radio frequency interference in said received signal,

said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and

the first said of at least one passive analog circuit comprising a differential input and the last of said at least one active analog circuit comprising a single-ended output.

71. A signal to interference enhancer comprising:

at least one passive analog circuit operative to decrease radio frequency interference in a received signal; and

at least one active analog circuit operative to decrease radio frequency interference in said received signal,

said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and

the first of said at least one passive analog circuit comprising a single-ended input and the last of said at least one active analog circuit comprising a single-ended output.

72. A signal to interference enhancer comprising:

at least one passive analog circuit operative to decrease radio frequency interference in a received signal; and

at least one active analog circuit operative to decrease radio frequency interference in said received signal,

said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and

the first of said at least one passive analog circuit comprising a single-ended input and the last of said at least one active analog circuit comprising a differential output.

73. A signal to interference enhancer comprising:

at least one passive analog circuit operative to decrease radio frequency interference in a received signal; and

at least one active analog circuit operative to decrease radio frequency interference in said received signal,

said at least one passive analog circuit and said at least one active analog circuit being arranged in series for providing radio frequency signal to interference enhancement to said received signal; and

said at least one active analog circuit operative to interface with an XDSL modem.

74. A noise suppressing transformer assembly comprising:
at least one noise suppressor comprising:
an amorphous magnetic core; and
a bifilar winding wound around said amorphous magnetic core; and
a transformer comprising:
at least one core comprising at least a ferrite material; and
at least one coil wound about said at least one core,
said at least one noise suppressor and said transformer being arranged in series.

75. A signal to interference enhancer embodied in a circuit package and comprising:
a low-pass EMI filter operative to attenuate interference at frequencies above a desired frequency pass band; and
a plurality of cascaded common mode chokes connected in series with said EMI filter, said common mode chokes being operative to attenuate interference at frequencies within said desired frequency pass band; and
each of said low-pass EMI filter and said plurality of cascaded common mode being contained in a separate metallic enclosure.

76. A signal to interference enhancer embodied in a circuit package and comprising:
a low-pass EMI filter operative to attenuate interference at frequencies above a desired frequency pass band; and
a plurality of cascaded common mode chokes connected in series with said EMI filter, said common mode chokes being operative to attenuate interference at frequencies within said desired frequency pass band;

said plurality of cascaded common mode chokes being contained in a metal enclosure and said EMI filter being embodied in a feed-through device inserted in a wall of said enclosure.

77. ²⁵ A transformer comprising:

at least one core comprising at least one of metal-based amorphous material and a ferrite material;

at least one coil wound about said at least one core; and
at least one aluminum foil shield wound around at said least one coil.

78. ²⁶ A noise suppressor embodied in a circuit package comprising:

an amorphous magnetic core;
a bifilar winding wound around said amorphous magnetic core, said bifilar winding comprising an input portion and an output portion; and
a metallic barrier located across said amorphous magnetic core and between said input portion and said output portion in order to reduce parasitic input to output interference coupling.